

Whatever may be the geological value of the argument, we have to thank the author for the trouble he has taken to put on record all that he knows about this prehistoric man, and for the minute description and excellent plates (by Erxleben) of the calvarium, lower jaw, and teeth (plates i., ii., and iii.), and the femur (pl. iv.) of this ancient representative of the aborigines formerly living on the old Thames bank.

## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

November 5, 1884.—Prof. T. G. Bonney, D.Sc., LL.D., F.R.S.,  
President, in the Chair.

The following communications were read:—

1. “On a new Deposit of Pliocene Age at St. Erth, 15 miles east of the Land’s End, Cornwall.” By S. V. Wood, Esq., F.G.S.

The deposit described in this paper occurs about 5 miles north-east of Penzance, and consists of a tenacious blue clay with shells, resting on sand, and passing upwards into a yellow unfossiliferous clay, which is overlain unconformably by the earth with angular fragments, under which the ancient beaches of the British Channel (with which beaches, however, the deposit now described has no connection) are buried. It has been excavated for the underlying sand at intervals during the last fifty years, but has been disused since 1881–82, when it was temporarily worked to supply the yellow part of the clay for the Penzance dock-works.

The author has got together, partly from correspondents in Cornwall and partly from his own researches in clay consigned to him, upwards of 40 species of Mollusca, inclusive of a few of which only fragments have as yet occurred, and of several minute species. Among these, besides some that are apparently altogether new, are some particularly characteristic species of the Red Crag not known living, such as *Cypræa (Trivia) wellana*, Sow.; *Melampus pyramidalis*, Sow.; and *Nassa granulata*, Sow. (or else *N. granifera*, Dujardin), as well as other characteristic Crag species that still live, but not north of the coast of Spain, such as *Turritella triplicata*, Brocchi (*T. incrassata*, Sow.), and *Ringicula buccinea*, Brocchi.

The most interesting feature of the fauna, however, consists in the six species of *Nassa* that the deposit has hitherto yielded, of which all but one, *N. granulata*, Sow. (or *granifera*, Dujardin), are unknown from any formation of Northern Europe, and occur, whether in the living or fossil state, only in the southern half of Europe\*. One of these is *Nassa mutabilis*, Linné, which now lives

\* *N. conglobata*, a species of a group near to that of *mutabilis*, has occurred in the Red Crag; but, so far as the author is aware, neither that shell, nor any of the group to which it belongs, has occurred in any other formation of Northern Europe.

throughout the Mediterranean, but outside that sea not north of Cadiz (lat.  $36^{\circ} 30'$ ); and two others are new species of this exclusively southern *mutabilis*-group. Another seems to be a rare Italian Upper-Pliocene species of the *reticulata*-group, *N. reticostata*, Bellardi; while the sixth is the Lower Pliocene and Upper-Miocene species, *N. serrata*, Brocchi. This shell, in the variety of form it presents at St. Erth (where it is one of the most frequent shells), seems to connect the Red-Crag *N. reticosa*, Sow., with the Italian *N. serrata*, while the shorter forms of it are identical with the Italian Lower-Pliocene *N. emiliana*, Mayer. The fauna is altogether southern, no exclusively Arctic shell having as yet occurred in it.

The author regards the bed as clearly Pliocene, and inclines to the opinion that it is rather Newer than Older Pliocene; that is to say, it is coeval with the Red Crag, but its affinities are more with the Pliocene of Italy than with the Pliocene of the North-Sea region; and this seems to show that during its deposition there was no communication between the Atlantic and the North Sea, except round the north of Britain, the refrigeration of the water by the nine degrees of latitude, through which Britain extends northwards from St. Erth, preventing the access of the Italian group of *Nassa* to that sea. This view is also strengthened by the absence of any close agreement between the fauna of St. Erth and that of the not far distant Pliocene of Normandy, the faunal affinities of both the older and newer parts of that Pliocene (the Conglomérat à Térébratules and Marnes à *Nassa*, regarded by geologists as of the age of the Coralline and Red Crag respectively) being more with the North-Sea Crag than with the St.-Erth bed.

As regards the geography of the immediate neighbourhood during its accumulation, the bed is the deposit of a strait that joined the sea on the north of Cornwall (St. Ives Bay) to that on the south of the county (Mounts Bay); and which insulated the high ground of the Land's-End district from the rest of Britain. The elevation of the shell-bearing part of the clay, as ascertained for the author by a set of levels run by Mr. Nicholas Whitley of Truro, C.E., who first brought the bed to public notice in the 'Transactions of the Royal Geological Society of Cornwall,' is 98 feet above mean-tide mark in the Hayle estuary, near to it, the surface of the ground being about 15 feet higher. Angular stones of small dimensions (none yet met with by the author exceeding 3 cubic inches) occur occasionally in the clay along with the shells, in amount of about one pound to a hundredweight of the clay, indicating, apparently, the drift of coast-ice over the strait during the deposit: but the author has only noticed one rounded pebble in the clay he has searched through.

Dr. GWYN JEFFREYS expressed his regret that the author of this important communication was prevented by illness from being present at the meeting, and said that the paper exhibited indications of the great energy possessed by the author notwithstanding his bad state of health. Great credit was also due to Mr. Robert Bell for

his share of the work. After careful examination Dr. Jeffreys recognized 50 species among the fossils obtained from the deposit at St. Erth; but from the number given by Mr. Wood he deducted 5 for duplicates, and one which he thought was not a mollusk. There were thus 44 or 45 species, out of which 11 or 12 are recent and 33 or 34 extinct. Of the latter 11 only are known to him from Tertiary deposits, 4 being of Miocene age, and all of them Pliocene. 22 species were unknown to him either as Tertiary or recent. For the accurate determination of the species the collection, when more complete, would have to be critically compared with recent forms, and the necessary allowance made for that slight divergence which was always observable in the shells of species whose existence extended over a long period of time. Dr. Jeffreys thought that the author had not quite sufficient knowledge of recent Mollusca for his determinations to be thoroughly accurate. The list of shells needs a careful re-comparison with the species contained in the Tertiary collections of Europe.

He further remarked that no deposits of Glacial age have hitherto been found in the south of England. He was not clear whether the St. Erth deposit was of older Pliocene or possibly of Upper Miocene age. *Nassa serrata*, Brocchi, was one of the few species in the list identical with Crag forms, namely *Buccinum reticosum* of Sowerby. The deposit did not seem to him to be connected with any Crag bed. A bed near Antibes, in the South of France, seemed to him to resemble the St. Erth deposit in many of its characters, and the mollusca of these two deposits should be critically compared.

Prof. PRESTWICH said that this discovery of Mr. Searles Wood was the most interesting that had been made upon the southern coast of England for many years. It was the first clear evidence from fossils of a depression in Cornwall since Palæozoic times, as the beds near St. Austell contain no organic remains. The high- and low-level beaches in Jersey and Guernsey are also unfossiliferous. He felt the same difficulty as Mr. Wood in correlating the beds in Brittany. The beds at Boscq d'Aubigny, in Normandy, present many points of analogy with those of St. Erth. There is the same preponderance of Subapennine and Mediterranean species, with many Crag fossils, but the species are different.

Mr. ERPERIDGE thought that the author had been rather hurried in drawing his conclusions, and that more stratigraphical and geographical evidence as to the distribution of the bed, and a careful survey of the neighbouring coast were requisite. He said that Mr. Solly had tried to make out the succession of the clays, and Mr. Bell had done much with the fossils, but no doubt many more fossils were yet to be found, and the Foraminifera, which are numerous, had not been determined. For his own part, he had much faith in Foraminifera, when properly determined, as a means of settling the age of such deposits.

2. "The Cretaceous beds at Black Ven, near Lyme Regis, with some supplementary remarks on the Blackdown Beds." By the Rev. W. Downes, B.A., F.G.S.

The author described a new exposure of the Cretaceous deposits at Black Ven, and stated that the Cliff-section measures 300 feet in height, of which the Lias occupies 200 feet, and the Cretaceous beds the remaining 100 feet. Of the latter the lower 25 feet consist of black loamy clay, passing up into yellowish-brown non-calcareous sands 75 feet thick, capped with chert-gravel. From one point in the clay the author obtained a few fossils, the most abundant being *Lima parallela*. The overlying sands, of ordinary Greensand type, furnished no fossils, although traces of their former existence occurred in some abundance. The only species identifiable from the casts in loose sand was *Cyprina cuneata*. At about 50 feet, nearly in a straight line above the point in the Gault-clay where the author had obtained fossils, he discovered a small patch or nest of mostly fragmentary silicified fossils, with a somewhat ferruginous matrix. The most abundant species were *Cyprina cuneata* and *Gervillia rostrata*; the associated forms were *Cytherea caperata*, *Trigonia seabricula*, *Cucullea glabra* and *fibrosa*, *Cardium proboscideum*, *Pecten orbicularis* and *quinquecostatus*, *Turritella granulata*, *Exogyra*, *Phasiarella*, *Serpula*, and *Siphonia*. Only one species is doubtfully common to the two horizons from which the fossils were procured, namely, *Turritella granulata*.

The author regards the fauna of the sands, thus revealed, as approaching the Blackdown fauna, and the sands as the equivalent beds. The absence of *Pectunculus umbonatus* and *sublavis* might serve to indicate that the sands at Black Ven were Lower Blackdown; but *Cyprina cuneata*, at Blackdown, characterizes a bed intermediate between those containing the above two *Pectunculi*. The evidence, in the author's opinion, seems to show an alternation of specific horizons, an inoculation due to changing littoral conditions, but with a general thinning-out to the westward, from which he concluded that the conditions of deposition were such that it will be impossible to recognize in the Cretaceous beds of the West of England the subdivisions of Gault and Upper Greensand which are so well marked to the eastward.

In conclusion, the author noticed some additions to his list of Blackdown and Haldon fossils, published in the 'Quarterly Journal' for 1882.

3. "On some Recent Discoveries in the Submerged Forest of Torbay." By D. Pidgeon, Esq., F.G.S.

The submerged forest of Torbay has been described by several geologists, among others by De la Beche, Godwin-Austen, and Pengelly. The latter, who has paid particular attention to the deposit, has inferred that a depression of 40 feet has taken place since the forest grew, and that the growth of the forest was at a

period when the mammoth existed, a molar of that animal having been dredged at a depth of five or six fathoms, and having been apparently derived from the Forest-bed.

The submerged forest rests upon a considerable thickness of clay, evidently the soil in which the trees grew. The clay rests upon Trias, a breccia of Devonian fragments intervening in places. This breccia appears to be of glacial age.

The gales of the winter of 1883-84 caused the exposure of considerable areas of the clay between tide-marks; and in one place, resting upon the breccia, two aggregations of rolled trap pebbles were found. These pebbles were shown to have probably served as smelting-hearthths. In their neighbourhood an ingot of copper, a fragment of a second, some tin slag, a piece of glass, flint implements, and other articles were found, together with remains of piles driven into the ground. These traces of human work apparently belong to the bronze age. In Goodrington Bay pewter vessels, apparently of Roman date, were found by the writer's son in a bed 10 feet below high-tide mark, or at a lower level than that of the bronze-age relics.

After referring to the occurrence of some estuarine shells (*Scrobicularia*, *Hydrobia*, *Littorina*, and *Melampus*) in the clay near Redcliffe Towers, at the level where similar mollusca now exist (an occurrence which may, however, be due to a recent mixing of deposits), the author pointed out that as the coast is known to have undergone no change of level for nearly 2000 years, it is unlikely that it can have been raised 40 feet, and again depressed to the same extent, since the beginning of the bronze period, not more than about fifteen centuries earlier. It is more probable that the clay bed was deposited in a shallow mere or marsh, of land-water kept back by the sea-beach, which was then some hundreds of feet further to seaward, and that the forest, which consisted chiefly of willows, grew on the marsh. The mammoth tooth may have been derived from an older deposit, all other remains of mammalia obtained from the Forest-bed belonging to animals still existing.

---

## MISCELLANEOUS.

*Contributions to the Biology of Spiders.*

By DR. FRIEDRICH DAHL.

IN the first part of the next (ninth) volume of the 'Vierteljahrschrift für wissenschaftliche Philosophie' an attempted representation of the psychical processes in spiders will be published by me. As certain points in the work may also be interesting to zoologists, I venture here to communicate very briefly the chief results of my investigations, referring to the above-mentioned memoir for further details and proofs. In that memoir I have first of all treated of the sensorial perceptions and then passed to the higher mental life.